



DISASTER RECOVERY MAPPING APP

SE 4485 • Spring 2025 • Group 10
Sponsor: Fellows Consulting Group

TABLE OF CONTENTS

1. INTRODUCTION
Meet the team

2. CROWDSTRIKE & IT DISASTERS
Why did Delta manually
reset 40,000 servers?

3. UNDERSTANDING A CMDB
Strengths & limitations of
existing datasets

4. OUR PROJECT
Goals, requirements,
constraints, & workflow

5. IMPLEMENTATION & DEMO
Our solution and its
features

6. CONCLUSION
Results and reflection



1

MEET THE
TEAM

Software Engineering Group 10



2

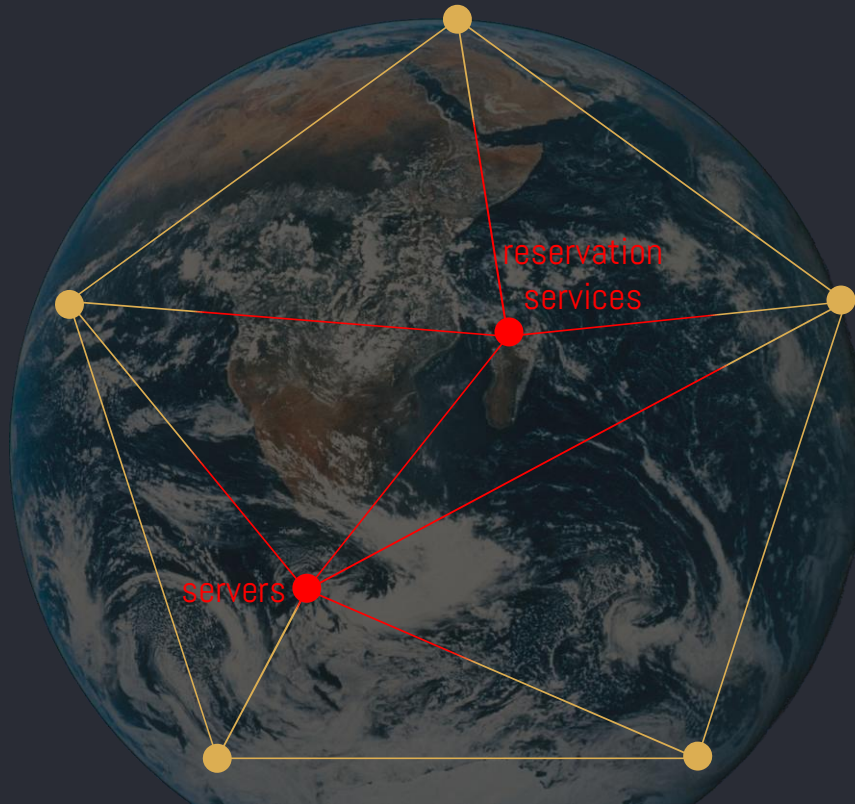
CROWDSTRIKE & IT DISASTERS

“We currently estimate that CrowdStrike’s update affected

8,500,000

Windows devices” — Microsoft, July 20, 2024 [1]

IT DISASTER RECOVERY



EXAMPLE: Delta

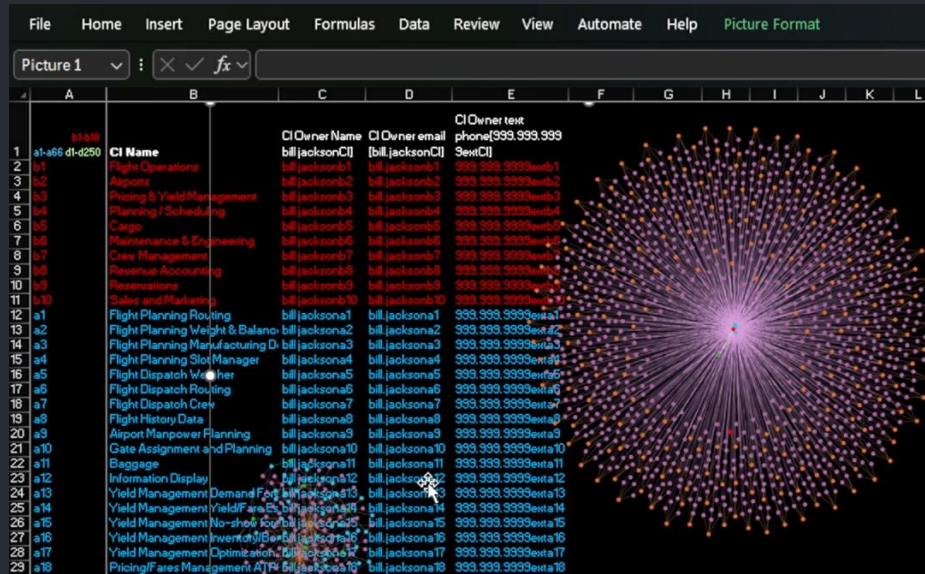
The CrowdStrike update affected Delta's servers

- 40,000 of which had to be reset
- Affected several critical services
- 7,000 flights relied on those services^[1]

UNDERSTANDING

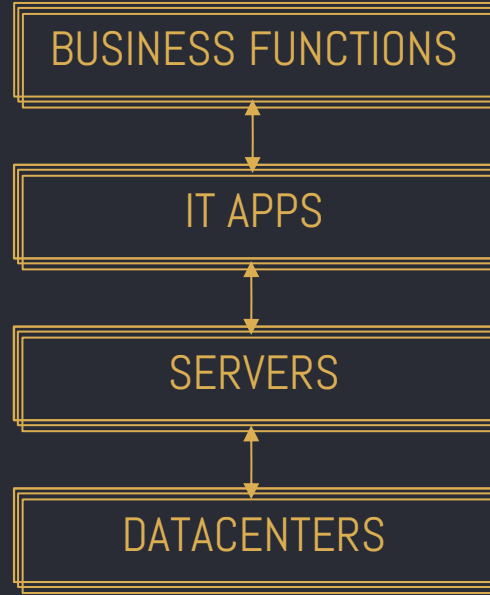
A CMDB & why having one isn't enough

3



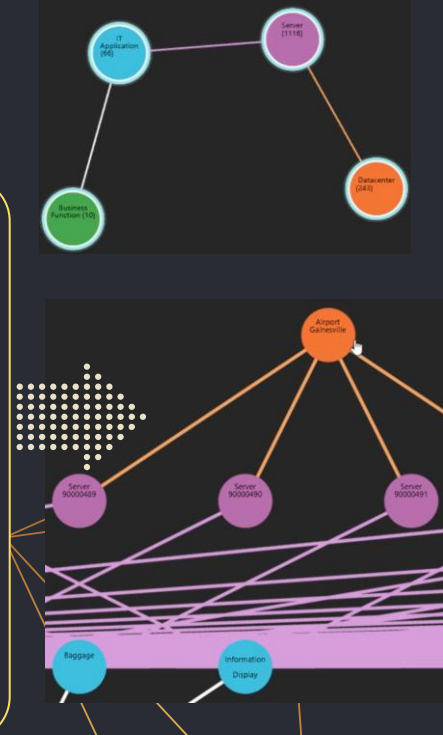
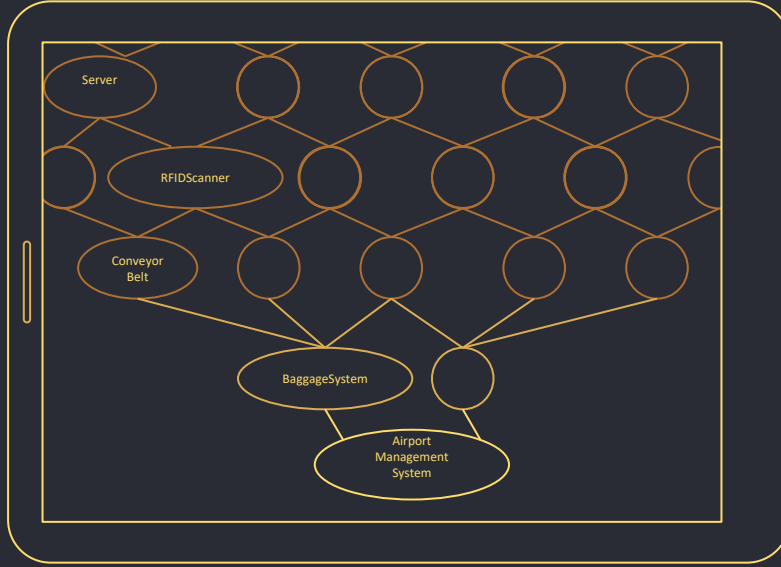
	A	B	C	D	E	F	G	H	I	J	K	L
1	###				CI Owner text							
2	st-s66 dt-d250	CI Name	CI Owner Name	CI Owner email	phone(999.999.999							
3	a1	Flight Operations	bill.jackson@CI	[bill.jackson@CI]	999.999.999ext1							
4	a2	Flight Operations	bill.jackson@2	bill.jackson@2	999.999.999ext2							
5	a3	Pricing & Yield Management	bill.jackson@3	bill.jackson@3	999.999.999ext3							
6	a4	Planning / Scheduling	bill.jackson@4	bill.jackson@4	999.999.999ext4							
7	a5	Cargo	bill.jackson@5	bill.jackson@5	999.999.999ext5							
8	a6	Maintenance & Engineering	bill.jackson@6	bill.jackson@6	999.999.999ext6							
9	a7	Crew Management	bill.jackson@7	bill.jackson@7	999.999.999ext7							
10	a8	Revenue Accounting	bill.jackson@8	bill.jackson@8	999.999.999ext8							
11	a9	Reservations	bill.jackson@9	bill.jackson@9	999.999.999ext9							
12	a10	Sales and Marketing	bill.jackson@10	bill.jackson@10	999.999.999ext10							
13	a1	Flight Planning Routing	bill.jackson@1	bill.jackson@1	999.999.999exta1							
14	a2	Flight Planning Weight & Balance	bill.jackson@2	bill.jackson@2	999.999.999exta2							
15	a3	Flight Planning Manufacturing Data	bill.jackson@3	bill.jackson@3	999.999.999exta3							
16	a4	Flight Planning Slot Manager	bill.jackson@4	bill.jackson@4	999.999.999exta4							
17	a5	Flight Dispatch Weather	bill.jackson@5	bill.jackson@5	999.999.999exta5							
18	a6	Flight Dispatch Routing	bill.jackson@6	bill.jackson@6	999.999.999exta6							
19	a7	Flight Dispatch Crew	bill.jackson@7	bill.jackson@7	999.999.999exta7							
20	a8	Flight History Data	bill.jackson@8	bill.jackson@8	999.999.999exta8							
21	a9	Airport Manpower Planning	bill.jackson@9	bill.jackson@9	999.999.999exta9							
22	a10	Gate Assignment and Planning	bill.jackson@10	bill.jackson@10	999.999.999exta10							
23	a11	Baggage	bill.jackson@11	bill.jackson@11	999.999.999exta11							
24	a12	Information Display	bill.jackson@12	bill.jackson@12	999.999.999exta12							
25	a13	Yield Management Demand Forecasting	bill.jackson@13	bill.jackson@13	999.999.999exta13							
26	a14	Yield Management Yield Fare Estimation	bill.jackson@14	bill.jackson@14	999.999.999exta14							
27	a15	Yield Management No-show Forecasting	bill.jackson@15	bill.jackson@15	999.999.999exta15							
28	a16	Yield Management Inventory Control	bill.jackson@16	bill.jackson@16	999.999.999exta16							
29	a17	Yield Management Optimization	bill.jackson@17	bill.jackson@17	999.999.999exta17							
30	a18	Pricing/Fares Management	bill.jackson@18	bill.jackson@18	999.999.999exta18							

CMDBs



VISUALIZING THE CMDB

Flight	Operations	Server	Manufacturer	Model	Serial Number	IP Address	MAC Address
52	Dallas Forest DC	server83a55					
53	1181-1191	Server9000067	bill.jacksons	191	bill.jacksons191	999.999.999ext	
54	1191-1192	Server9000068	bill.jacksons	192	bill.jacksons192	999.999.999ext	
55	1201-1193	Server9000069	bill.jacksons	193	bill.jacksons193	999.999.999ext	
56	1221-1194	Server9000070	bill.jacksons	194	bill.jacksons194	999.999.999ext	
57	1222-1195	Server9000071	bill.jacksons	195	bill.jacksons195	999.999.999ext	
58	1231-1196	Server9000072	bill.jacksons	196	bill.jacksons196	999.999.999ext	
59	1241-1197	Server9000073	bill.jacksons	197	bill.jacksons197	999.999.999ext	
60	1251-1198	Server9000074	bill.jacksons	198	bill.jacksons198	999.999.999ext	
61	1261-1199	Server9000075	bill.jacksons	199	bill.jacksons199	999.999.999ext	
62	1271-1200	Server9000076	bill.jacksons	200	bill.jacksons200	999.999.999ext	
63	1281-1201	Server9000077	bill.jacksons	201	bill.jacksons201	999.999.999ext	
64	1291-1202	Server9000078	bill.jacksons	202	bill.jacksons202	999.999.999ext	
65	1301-1203	Server9000079	bill.jacksons	203	bill.jacksons203	999.999.999ext	
66	1311-1204	Server9000080	bill.jacksons	204	bill.jacksons204	999.999.999ext	
67	1321-1205	Server9000081	bill.jacksons	205	bill.jacksons205	999.999.999ext	
68	1331-1206	Server9000082	bill.jacksons	206	bill.jacksons206	999.999.999ext	
69	1341-1207	Server9000083	bill.jacksons	207	bill.jacksons207	999.999.999ext	
70	1351-1208	Server9000084	bill.jacksons	208	bill.jacksons208	999.999.999ext	
71	1361-1209	Server9000085	bill.jacksons	209	bill.jacksons209	999.999.999ext	
72	1371-1210	Server9000086	bill.jacksons	210	bill.jacksons210	999.999.999ext	
73	1381-1211	Server9000087	bill.jacksons	211	bill.jacksons211	999.999.999ext	
74	1391-1212	Server9000088	bill.jacksons	212	bill.jacksons212	999.999.999ext	
75	1401-1213	Server9000089	bill.jacksons	213	bill.jacksons213	999.999.999ext	
76	1411-1214	Server9000090	bill.jacksons	214	bill.jacksons214	999.999.999ext	
77	1421-1215	Server9000091	bill.jacksons	215	bill.jacksons215	999.999.999ext	
78	1431-1216	Server9000092	bill.jacksons	216	bill.jacksons216	999.999.999ext	
79	1441-1217	Server9000093	bill.jacksons	217	bill.jacksons217	999.999.999ext	
80	1451-1218	Server9000094	bill.jacksons	218	bill.jacksons218	999.999.999ext	
81	1461-1219	Server9000095	bill.jacksons	219	bill.jacksons219	999.999.999ext	
82	1471-1220	Server9000096	bill.jacksons	220	bill.jacksons220	999.999.999ext	
83	1481-1221	Server9000097	bill.jacksons	221	bill.jacksons221	999.999.999ext	
84	1491-1222	Server9000098	bill.jacksons	222	bill.jacksons222	999.999.999ext	
85	1501-1223	Server9000099	bill.jacksons	223	bill.jacksons223	999.999.999ext	
86	1511-1224	Server9000100	bill.jacksons	224	bill.jacksons224	999.999.999ext	
87	1521-1225	Server9000101	bill.jacksons	225	bill.jacksons225	999.999.999ext	
88	1531-1226	Server9000102	bill.jacksons	226	bill.jacksons226	999.999.999ext	
89	1541-1227	Server9000103	bill.jacksons	227	bill.jacksons227	999.999.999ext	
90	1551-1228	Server9000104	bill.jacksons	228	bill.jacksons228	999.999.999ext	
91	1561-1229	Server9000105	bill.jacksons	229	bill.jacksons229	999.999.999ext	
92	1571-1230	Server9000106	bill.jacksons	230	bill.jacksons230	999.999.999ext	
93	1581-1231	Server9000107	bill.jacksons	231	bill.jacksons231	999.999.999ext	
94	1591-1232	Server9000108	bill.jacksons	232	bill.jacksons232	999.999.999ext	
95	1601-1233	Server9000109	bill.jacksons	233	bill.jacksons233	999.999.999ext	
96	1611-1234	Server9000110	bill.jacksons	234	bill.jacksons234	999.999.999ext	
97	1621-1235	Server9000111	bill.jacksons	235	bill.jacksons235	999.999.999ext	
98	1631-1236	Server9000112	bill.jacksons	236	bill.jacksons236	999.999.999ext	
99	1641-1237	Server9000113	bill.jacksons	237	bill.jacksons237	999.999.999ext	
100	1651-1238	Server9000114	bill.jacksons	238	bill.jacksons238	999.999.999ext	
101	1661-1239	Server9000115	bill.jacksons	239	bill.jacksons239	999.999.999ext	
102	1671-1240	Server9000116	bill.jacksons	240	bill.jacksons240	999.999.999ext	
103	1681-1241	Server9000117	bill.jacksons	241	bill.jacksons241	999.999.999ext	
104	1691-1242	Server9000118	bill.jacksons	242	bill.jacksons242	999.999.999ext	
105	1701-1243	Server9000119	bill.jacksons	243	bill.jacksons243	999.999.999ext	





4

OUR PROJECT

Goals, requirements, scope, deliverables,
constraints, & workflow

OUR GOAL

ENABLE

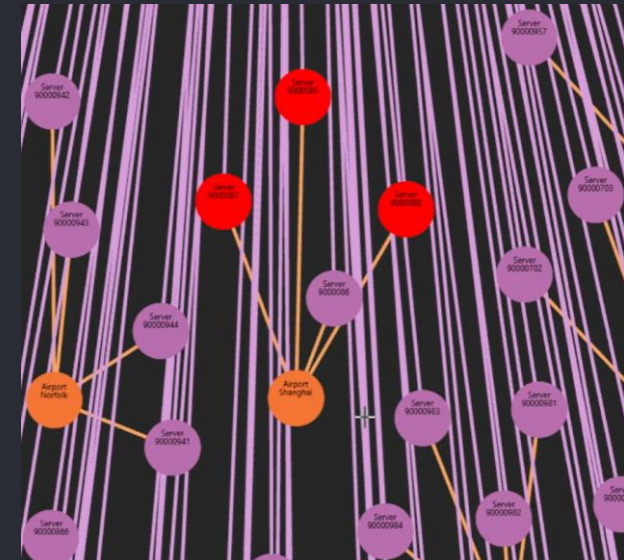
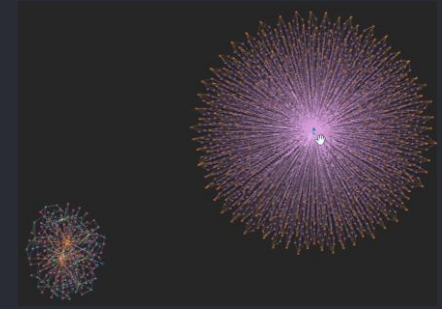
Asset visibility

AUTOMATE

Diagram creation

EMPOWER

Failure analysis



REQUIREMENTS

FUNCTIONAL



FR1

Import CMDB



FR2

High-level "schema graph"



FR3

Low-level "data graph"



FR4

Failure analysis



FR5

Graph adjustment



FR6

Save graph to CMDB

NON-FUNCTIONAL

Fast at scale

NFR1-2



Secure & offline

NFR3-5



Simple & intuitive

NFR6



Maintainable

NFR8-9



Compatible

NFR-10



Reliable

NFR-11



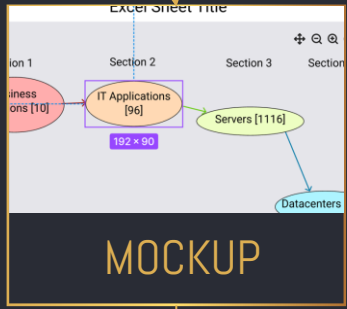
DEVELOPMENT

High	The system shall support creation of a data graph displaying the configurations items in the CMDB.
High	The system shall display all included individual items in the CMDB as nodes in the graph.
High	The system shall label each node in the data graph with the name of the configuration item.
Medium	The system shall color each node in the data graph according to the type of the configuration item.
Medium	The system shall use a unique color for each type of node.
High	The system shall display all bidirectional relations between associated nodes in edges in the data graph.
Medium	The system shall make it direct connect with the parent each relation in a hierarchical tree for the resulting graph. (e.g. Element -> Location -> Component)



R2: The system shall create a schema graph representing the high-level schema of the CMDB.

REQUIREMENTS



```
487 + if (nv1Ref.value) {
488 +   toggleSelectionMode();
```

CODE REVIEW

Releases 8

1.2.4 **Latest** [Download]

2 days ago

RELEASE

WORKITEM

Feature: generate schema tree for imported database

Feb 20 2 Requirement: R2 1 2T

PULL REQUEST

Feature: generate schema tree #21 [Merged]

pmxahogan merged 8 commits into main from feature-schema-tree on Mar 1

+1,148 -169 [Commits]

ThePublicCheese commented on Feb 27 • edited

Generates and displays a schema tree of the imported dataset using NVL.

CI/CD

format 27% build 44%

lint 31% coverage 31%





5



IMPLEMENTATION & DEMO

Our methodology and results

TECH STACK - WHAT WE USED

 **IDE** VS Code, Webstorm

TypeScript **LANGUAGE** 


 **DATABASE** Neo4J

Electron · Vue **FRAMEWORK** 

 **INSTALLER** WiX

ESLint · Prettier **STYLE** 

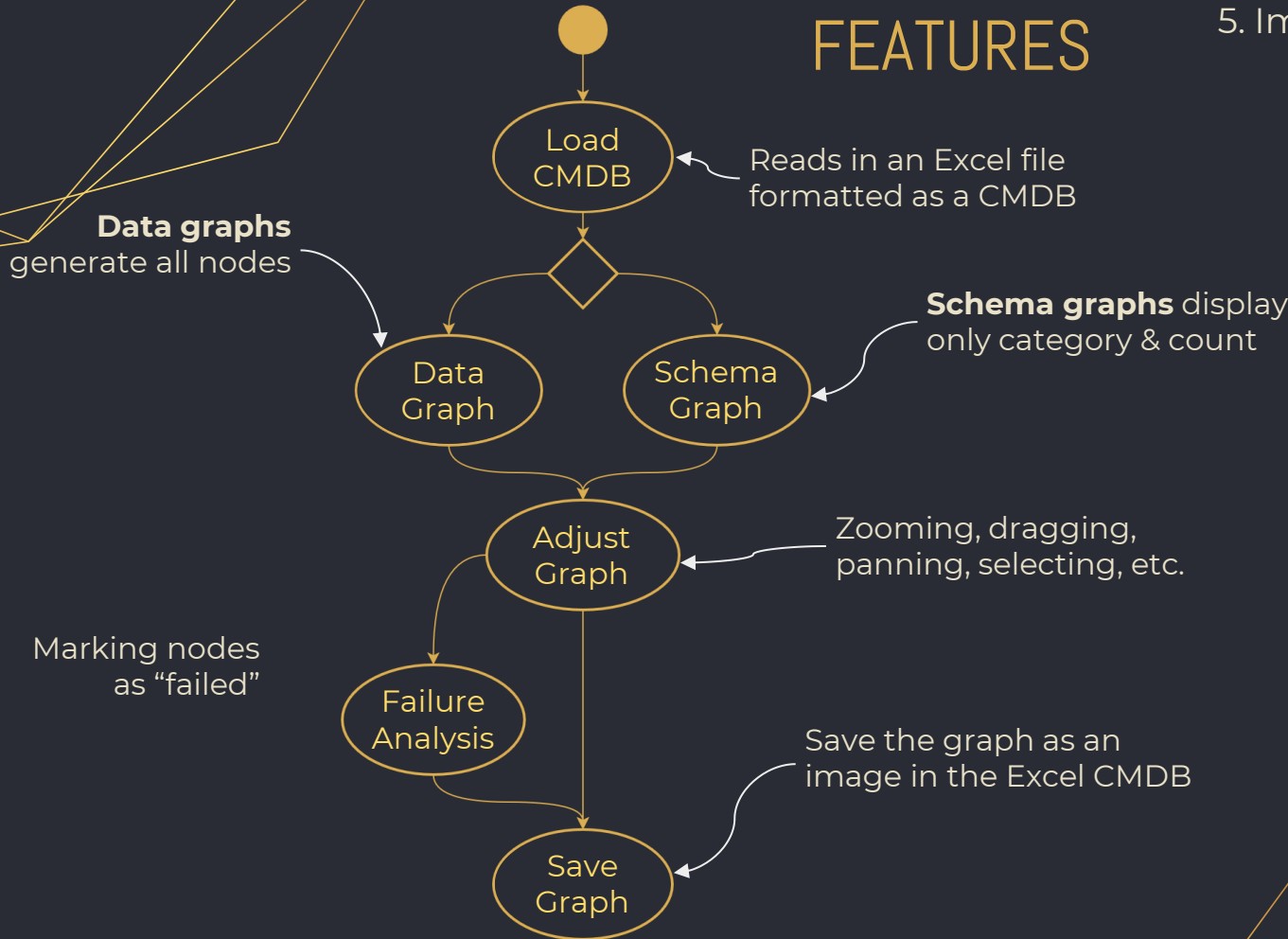
 **CI / CD** Github Actions

Vitest · Selenium **TESTS** 

 **SCM** Git · Github

Figma **MOCKUP** 

FEATURES



EXAMPLE: Airline

An IT analyst working for an airline wants to...

- Quickly **model** the CMDB's overall schema
- **Simulate** a failure scenario
- **Save** the results and show them to colleagues

DEMO

5. Implementation & Demo



6

CONCLUSION

REQUIREMENTS TRACEABILITY

Requirement ID	Requirement Description	E2E Tested	Done
FR1	CMDB import (Excel → Neo4j load)	✓	✓
FR2	High-level schema graph	✓	✓
FR3	Detailed data graph	✓	✓
FR4	Failure analysis (outage & blast radius)	✓	✓
FR5	Graph adjustments (drag/zoom/etc.)	✓	✓
FR6	Save image to CMDB	✓	✓

PROJECT SUMMARY

PROBLEM

Data Recovery analysts & IT professionals (our primary stakeholders) **manually** sketch bespoke diagrams of configuration items. This is **tedious, unreliable, and problematic** in a serious IT disaster.



OUR SOLUTION

Automated creation of **graph diagrams** from a **CMDB**, providing **visualization** of connections & **fault patterns**



IMPACT

Simplified asset visibility & **empowered** disaster recovery will **reduce downtime, improve** disaster **planning**, increase **reliability**, and enhance **customer satisfaction**

THANKS!

ANY QUESTIONS?

Works Cited:

[1] D. Weston, "Helping our customers through the CrowdStrike outage," *The Official Microsoft Blog*, Jul. 20, 2024.
<https://blogs.microsoft.com/blog/2024/07/20/helping-our-customers-through-the-crowdstrike-outage/>

Additional References:

[2] K. Schmidt, High availability and disaster recovery: Concepts, Design, Implementation. *Springer Science & Business Media*, 2006.

CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon**, infographics & images by **Freepik**.

